

**Staff Report  
for**

***Item 17***  
***Discussion***  
***August 26, 2004***

**To: John H. Robertus**  
**Executive Officer**

**From: Hashim Navrozali**  
**Water Resource Control Engineer**  
**Industrial Compliance Unit**

**Tentative Order No. R9-2004-0154**  
**NPDES Permit No. CA0001368**

**WASTE DISCHARGE REQUIREMENTS**

**FOR**

**DUKE ENERGY SOUTH BAY, LLC**  
**SOUTH BAY POWER PLANT**  
**SAN DIEGO COUNTY**

**DISCUSSION**

The Duke Energy LLC, South Bay Power Plant (SBPP) is a natural gas fueled steam electric power generating station that began operation in 1960. The facility is located at 990 Bay Boulevard, Chula Vista, California, on the southern edge of San Diego Bay. This 150-acre, 737-gross megawatt (MW) plant is located in Section 9, T18S, R2W SBBM.

Order No. 96-05 expired on November 14, 2001. Tentative Order No. 2001-283, renewing the NPDES permit for SBPP, was considered by the Regional Board at a public hearing on December 12, 2001. During this public hearing the Regional Board heard oral public testimony, but moved to delay action on the tentative Order until a future meeting.

Based on the need for updated studies, the Executive Officer issued a CWC Section 13267 letter to Duke Energy on May 24, 2002 directing it to conduct six studies to assess the impact of the intake structures and the discharge from the South Bay Power Plant (SBPP) on the biological resources and beneficial uses of south San Diego Bay.

Tentative Order No. R9-2004-0154 (*Waste Discharge Requirements Duke Energy South Bay, LLC, South Bay Power Plant, San Diego County*) renews and updates NPDES Permit No. CA0001368 and supersedes the current NPDES permit, Order No. 96-05, in its entirety. The tentative Order includes waste discharge requirements for the combined discharge of up to 601.13 million gallons per day (MGD) of elevated temperature once-through cooling water and other waste discharges from SBPP to south San Diego Bay.

The waste discharge requirements (including effluent and receiving water limitations, prohibitions, and monitoring requirements) contained in Order No. R9-2004-0154 are based on the federal NPDES regulations, the federal technological based standards for steam electric power plant (40 CFR 123), the provisions of Sections 316(a) and 316(b) of the Clean Water Act (CWA) (power plant intake structure and thermal discharge regulations), the State Thermal Plan, the Basin Plan, the *Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (Implementation Policy), and the California Toxics Rule (CTR). The tentative Order also updates the waste discharge requirements in the NPDES permit to reflect the elimination of low volume and metal cleaning wastes from SBPP to San Diego Bay in December 1997.

Order No. R9-2004-0154 also addresses where appropriate written comments provided by the public on the technical reports provided by Duke Energy on updated studies conducted at SBPP, during 2003. The studies were conducted to assess the impact of the intake structures and the discharge from the South Bay Power Plant (SBPP) on the biological resources and beneficial uses of south San Diego Bay and to verify compliance with Clean Water Act (CWA) Sections 316(a) and 316(b).

All other effluent limitations, prohibitions, or monitoring requirements contained in the tentative Order are the same or more stringent than those in Order No. 96-05.

#### CWA SECTION 316(a) and 316(b) STUDIES

Based on a review of current ambient water quality data for south San Diego Bay and consultations with resource and regulatory agencies, Regional Board staff concluded that previous CWA Sections 316 (a) (*Thermal Discharge Impacts*) and 316(b) (*Intake Structure Impacts*) studies conducted by Duke Energy at the SBPP were outdated. The studies did not fully represent existing conditions in south San Diego Bay and operational parameters at SBPP. Regional Board staff concluded that additional updated studies were needed.

Based on the need for updated studies, the Executive Officer issued a CWC Section 13267 letter to Duke Energy on May 24, 2002 directing it to conduct six studies to assess the impact of the intake structures and the discharge from the South Bay Power Plant (SBPP) on the biological resources and beneficial uses of south San Diego Bay.

The studies were conducted by Duke Energy's contractors *Tenera Environmental* and *Merkel & Associates*.

The updated Section 316(a) studies commenced in July 2003 and continued through the summer of 2003. These studies investigated the impacts of SBPP's thermal discharge on the intertidal and subtidal biological communities of south San Diego Bay with an emphasis on the plant's discharge channel. These studies were conducted in the summer months to monitor the impacts of the discharge at time of year when the water temperature in the discharge channel is the highest and conditions most stressful. The fish impingement and entrainment sampling associated with the updated Section 316(b) study was conducted over one complete annual cycle, commencing in December 2002 and concluding in December 2003.

The updated Section 316(a) studies were addressed under the technical study report titled "*SBPP Cooling Water System Effects on San Diego Bay, Volume 1: Compliance with Section 316(a) of the Clean Water Act for the South Bay Power Plant*". The updated Section 316(b) study were addressed under the technical study report titled "*SBPP Cooling Water System Effects on San Diego Bay, Volume II: Compliance with Section 316(b) of the Clean Water Act for the South Bay Power Plant*." The draft versions of the technical study reports were submitted in May 2004 and were made available for public review and comment. The final version of the technical study reports were submitted by Duke Energy on August 12, 2004. The final reports minimally addressed comments received from the U.S. EPA's contractor and interested parties. The changes were made to the final reports with respect to the draft versions were minor and did not impact the conclusions of the studies.

The Regional Board also provided copies of the technical study reports to USEPA's contractor Tetra Tech for its review and comment. Tetra Tech independently evaluated the results of the studies and provided recommendations to the Regional Board to incorporate specific effluent limitations and monitoring requirements into the renewal NPDES permit, based on the results of the studies.

#### Section 316(a) Study Findings

The Section 316(a) technical study report confirms that certain areas of the SBPP discharge channel do experience detrimental impacts from the elevated temperature discharge. These include a loss of eelgrass habitat and a lower diversity or loss of certain species of benthic invertebrates in the discharge channel. These impacts indicate that Duke Energy is not in full compliance with Section 316(a) requirements.

#### Mitigation Measures for Section 316(a)

The tentative Order requires Duke Energy to take measures to mitigate the detrimental impacts of its thermal discharge and to demonstrate compliance with Section 316(a) requirements. The tentative Order includes requirements for Duke Energy to develop, submit, and implement a workplan to achieve compliance with the temperature limitations at the Duke Energy property line (monitoring station S2). The temperature limitation compliance point is currently at monitoring station S1, 1,000 feet into the discharge channel. This change will enable demonstration of compliance of all discharge parameters at one unified sampling point (at the facility property line). This is consistent with Federal NPDES regulations, that require compliance of effluent discharge limitations at the point of discharge. Furthermore, this change will no longer provide a mixing or dilution zone for temperature.

Duke Energy is required to submit the workplan no later than 24 months after adoption of the Order. A progress report on the implementation of the workplan will be due no later than 30 months after adoption of the Order. A Final Technical Report shall be due no later than 24 months prior to the expiration of the Order. Compliance with the temperature limitations will be enforceable at monitoring station S2 (property line) on the expiration date of the Order.

Section 316(b) Study Findings

Following are some of the significant findings noted in the Section 316(b) report submitted by Duke Energy:

Entrainment and Impingement Losses

The estimated annual *Adult Equivalent Losses* of adult standing fish stocks (due to entrainment of larval species) in the Section 316(b) study ranged from 0.0034 percent (for Combtooth blennies) to 0.032 percent (for CIQ goby complex). The total annual impingement of fish under full operating flow rates was estimated to be 385,588 individuals weighing 556 kg.

Duke Energy has claimed that this level of entrainment and impingement losses represents a low potential risk to taxa populations. Tetra Tech and resource and regulatory agencies have expressed concerns about the validity and conclusions of the Section 316(b) study.

Best Technology Available (BTA)

A best technology available (BTA) analysis of intake structures was conducted as part of the Section 316(b) study. The alternate technologies to reduce impingement/entrainment losses were evaluated. These included closed-cycle cooling water systems, behavioral barriers, and physical barriers. Wet/dry hybrid cooling towers using untreated wastewater or desalinated water was the only viable closed-cycle cooling system for use at the SBPP. The report concluded that this option would not be feasible because of the short-term nature of Duke Energy's SBPP lease with the Port of San Diego, which expires in 2009. There would not be enough time to design, permit, and construct the cooling towers and other water treatment facilities. Furthermore, a cost/benefit analysis conducted for the wet/dry hybrid cooling towers indicated that the costs (amortized over the 5-year, expected, remaining life of the plant) were wholly disproportionate to the environmental benefits gained based on the entrainment/impingement data collected in 2003.

Regional Board staff in consultation with the U.S. EPA has concluded that Duke Energy should have conducted a BTA analysis of its intake structures based on cost amortization over a long-term (i.e. 30 year period), as part of its Section 316(b) study. A long-term analysis may have rendered alternate technologies such as fine mesh traveling screens and cooling tower systems cost effective. This indicates that Duke Energy did not fully implement the requirements of Section 316(b) in its 2003 study. Duke Energy will be required to conduct a revised BTA analysis based on a new Section 316(b) Phase II rule promulgated by the U.S. EPA in July 2004, for existing power plants. The new rule also establishes more stringent entrainment and impingement performance standards for

intake structures. The results of the 2003 study demonstrates that Duke Energy does not meet the impingement and entrainment performance standards for the new Phase II rule.

The Section 316(b) study report by reviewed by U.S. EPA's contractor Tetra Tech. In its memorandum submitted to the Regional Board on April 26, 2004 (see Attachment 1 to this Staff Report), Tetra Tech indicated that the 2003 Section 316(b) studies were based on the 1977 U.S. EPA guidance document *Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment*, since the new Phase II rule for Section 316(b) was not promulgated in 2003. As such, the models and methodologies used in the 2003 studies are no longer valid. Tetra Tech emphasized that the Section 316(b) studies do not comply with the new impingement and entrainment performance standards Phase II rule requirements. As discussed below, the Regional Board will require Duke Energy to take measures to implement the new Phase II rule and demonstrate compliance with Section 316(b) requirements.

*New Requirement for an updated Comprehensive Section 316(b) Demonstration Study:*

Pursuant to Section 125.95(b)(1) of the new 316(b) Phase II rule for existing power plants, the tentative Order requires that Duke Energy to perform a *Comprehensive Demonstration Study* to demonstrate that the power plant can comply with the technology and/or restoration compliance alternatives of the new Section 316(b) rule. The new rule allows the discharger up to four years to demonstrate compliance with the requirements of the new rule.

Duke Energy is also required to submit a *Proposal for Information Collection* prior to submittal of the *Comprehensive Demonstration Study*. The *Proposal for Information Collection* will include a description of the proposed and/or implemented technologies, operational measures, and/or restoration measures to be evaluated in the *Comprehensive Demonstration Study*.

CALIFORNIA TOXICS RULE (CTR) AND IMPLEMENTATION POLICY

The tentative Order addresses implementation of the California Toxic Rule (CTR) and provisions of the *State Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (Implementation Policy). Pursuant to Section 1.3 of the Implementation Policy, a reasonable potential analysis (RPA) of the 126 priority metals listed in the CTR was conducted. The RPA was based on the concentration data submitted by Duke Energy for the CTR priority pollutants contained in SBPP's intake and effluent cooling water. The RPA indicated that copper in cooling water discharges from the SBPP has a reasonable potential to cause or contribute to the exceedance of the CTR water quality criteria of 3.1 µg/l (dissolved) and is therefore subject to effluent limitations.

The Implementation Policy requires that discharge effluent limitations for copper be specified as total recoverable concentrations. The Implementation Policy (p. 12, section 1.4.1, *Translators for Metals and Selenium*) specifies the use of a conversion factor to adjust a criterion expressed as a dissolved form to a total recoverable form. The CTR specifies the use of a default conversion factor of 0.83 for saltwater (in the absence of a site-specific translator for copper in south San Diego Bay). To calculate the total recoverable concentration the dissolved criterion is divide by the conversion factor.

Dissolved concentration criterion/0.83 = Total recoverable concentration.

Based on the algorithms contained in Section 1.4 (Calculation of Effluent Limitations) of the Implementation Policy and a default conversion factor for copper of 0.83, the Maximum Daily Emission Limit (MDEL) and Average Monthly Emission Limit (AMEL) for total recoverable copper concentrations were calculated. The calculated MDEL value of 4.44 µg/l and AMEL value of 3.53 µg/l for total recoverable copper are specified in the tentative Order.

Monitoring data submitted by Duke Energy for copper concentration in south San Diego indicates that ambient levels of total recoverable copper consistently exceeds 3.53 ug/l (i.e. the most stringent effluent limitations prescribed in the tentative Order). The once-through cooling water system at SBPP takes intake water from south San Diego Bay and discharges it back to the Bay, without treatment. Previous studies have shown that the power plant adds small amounts of copper to the intake water due to leaching of copper for condenser tubing. This infers that the copper concentrations in the discharge will be equal to or greater than the intake water. Since copper concentrations in the intake water are already higher than the value prescribed in the tentative Order, it is very likely that the copper in the discharge will not be able to comply with the effluent limitations.

The existing Order No. 96-05 requires Duke Energy to conduct effluent monitoring for metals (including copper) on a semiannual basis. Order No. 96-05 does not have effluent limitations for copper. Over the last four years (2000, '01, '02, and '03) Duke Energy provided a total of eight data points for copper in the discharge. One point (i.e. 7.6 ug/l, in 2000) would have exceeded the copper limitations prescribed in the tentative Order.

The tentative Order increases the monitoring frequency of copper in the effluent from semiannual (existing Order No. 96-05) to monthly. This increase in monitoring frequency clearly increases that likelihood that Duke will violate the copper limitations contained in the tentative Order.

Duke Energy has expressed concern that it will not be able to comply with copper effluent limitations specified in the tentative Order, because the background levels of copper in south San Diego already exceed the CTR criteria. Duke Energy has requested that the Regional Board not require it comply with the new copper limitations upon adoption of the tentative Order. Duke Energy has requested that the a compliance schedule needs to be incorporated into the tentative Order, allowing Duke Energy up to five years to comply with the new limitations.

#### SUMMARY OF SIGNIFICANT CHANGES

Following is a summary of changes and new requirements that have incorporated into tentative Order No. R9-2004-0154, with respect to the previous version of the NPDES permit (i.e. Order No. 96-05):

1. Effluent Limitations:

*Significant Changes:*

- a. Effluent limitations for total recoverable copper (4.44 ug/l – maximum daily and 3.53 ug/l – average monthly) have been incorporated into the tentative Order.
- b. The tentative Order eliminates intake water credits for acute toxicity and pH.

2. Monitoring Requirements:

*Significant Changes:*

- a. Monthly effluent dissolved oxygen (DO) monitoring has been added. The final Order may be re-opened to include an appropriate numerical effluent limitation for DO, after adequate effluent monitoring data for DO is collected and analyzed.
- b. Monthly effluent and receiving water monitoring for total recoverable copper have been added to enable demonstration of compliance with the new CTR effluent limitations for copper.
- c. Monthly effluent and receiving water monitoring for other priority metals (cadmium, lead, mercury, arsenic, chromium, silver, and zinc) have been added. The existing data for these metals suggests that effluent limitations (per CTR) will not be required.

Regional Board staff will be analyzing the monthly monitoring data for cadmium, lead, mercury, arsenic, chromium, silver, and zinc and periodically conducting a *Reasonable Potential Analysis* (RPA). If the RPA indicates that effluent limitations are needed for these metals, the NPDES permit will be amended to incorporate these limitations.

- d. Monitoring for total residual chlorine in the effluent has been increased from twice a month to weekly. Furthermore, weekly receiving water monitoring for total residual chlorine (at two stations in the discharge channel that are closest to the property line) has been added.
- e. The frequency of monitoring for acute/chronic toxicity in intake and effluent has been increased from quarterly to monthly.
- f. The bar rack approach velocity and sediment accumulation monitoring requirements for intake structures have been eliminated.

3. Special Studies and Workplans

- a. Requirement for Duke Energy to develop, submit, and implement a workplan to achieve compliance with the temperature effluent limitations at the Duke Energy property line

(monitoring station S2) in order to mitigate the detrimental impacts of its thermal discharge and to demonstrate compliance with Section 316(a) requirements.

- b. Requirement for Duke Energy to perform a *Comprehensive Demonstration Study* to demonstrate that the power plant can comply with the technology and/or restoration compliance alternatives of the new Section 316(b) rule.
- c. Requirement for Duke Energy to conduct a *Special Sunset Study* to evaluate the impacts of any proposed changes in the volume or temperature of the discharge on the beneficial uses of south San Diego Bay. This includes any temperature reductions that may occur in the discharger channel due to the required change in the temperature compliance point from S1 to the S2 (property line) by the expiration date of the Order. The Special Sunset Study would also include measures that would mitigate any adverse impacts resulting from significant modifications in the cooling water discharge.

Duke Energy is required to submit a Workplan for the Special Sunset Study no later than 24 months after adoption of the Order. The Workplan for the Special Sunset Study may be submitted in conjunction with the Workplan to move the temperature compliance point from S1 to the S2 (property line).

A Progress Report on the implementation of the Workplan shall be due 30 months after adoption of the Order. A Final Technical Report associated with the Special Sunset Study shall be due no later than 24 months prior to the expiration of the Order.

As part of the Special Sunset Study, the Regional Board or Executive Officer may recommend the formation of a technical advisory committee comprised of external technical experts to review and develop recommendations to the Regional Board on the Workplan for the Special Sunset Study and to review results of the study.

#### COMMENTS RECEIVED

As of August 18, 2004 (the deadline to receive written comments on the tentative Order) comment letters from the San Diego Bay Council, Duke Energy, the City of San Diego Councilmember Donna Fry, and the U.S. EPA have been received. Staff will be preparing a response to comments document to address the written comments received and will be providing the document to Regional Board members in the Supplemental Agenda Mailing, prior to the September 8, 2004 hearing. An Errata Sheet to the tentative Order, if needed, will also be included in the Supplemental Agenda Mailing.